DREDGED MATERIAL RESEARCH PROGRAM

MISCELLANEOUS PAPER D-78-1

A SURVEY OF POTENTIAL MEDICAL AND VETERINARY DISEASES AT HABITAT DEVELOPMENT FIELD SITES

by

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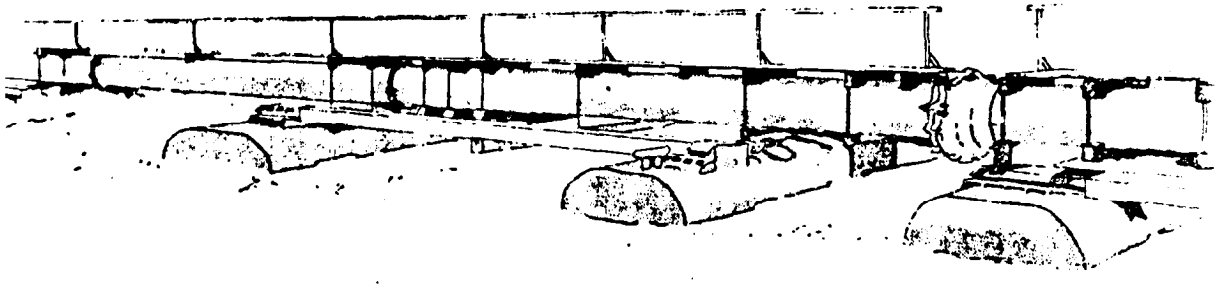
Final Report



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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
There is concern that the development of marshes and upland habitats on dredged material may increase the incidence of medical and veterinary diseases in the localities of those habitats. Faunal field inventory information and available literature were used to identify potential relationships between habitat associated animals and communicable diseases at habitat development field sites in Virginia, Texas, and Oregon. Medical and veterinary records were used to document the actual occurrence of diseases at these locations. No vector-borne, contact, or environmental diseases were identified from any of the field sites.

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31 August 1978

SUBJECT: Transmittal of Miscellaneous Paper D-78-1

TO: All Report Recipients

1. The Miscellaneous Paper transmitted herewith represents the results of one of the research efforts (work units) of the Corps of Engineers' Dredged Material Research Program (DMRP). This study was conducted by the Habitat Development Project (HDP) of the DMRP. The HDP had as its main objectives the development of wetland and upland habitats on dredged material and the evaluation of the impact of disposal in shallow water and upland sites.

2. This report, "A Survey of Potential Medical and Veterinary Diseases at Habitat Development Field Sites" (Work Unit 2A10), addresses the concern that the establishment of natural habitats on dredged material may increase the incidence of medical or veterinary diseases at those sites. Habitat development sites in Oregon, Texas, and Virginia were evaluated, and it was found that an increase in the incidence of vector-borne, contact, or environmental diseases would not be expected as a result of habitat development activities.

3. This work unit is of importance in assessing the overall environmental impact of the habitat development disposal alternative and is one of many research efforts in the HDP with a similar objective. This and related work units will be synthesized in a report entitled "Upland and Wetland Habitat Development with Dredged Material: Ecological Considerations" (2A08).

JOHN L. CANNON
Colonel, Corps of Engineers
Commander and Director

Preface

This report constitutes a literature survey of selected potential medical and veterinary diseases at three of the Dredged Material Research Program (DMRP), Habitat Development Project (HDP) field sites: Miller Sands Marsh and Upland Habitat Development Site, Columbia River, Oregon; Bolivar Peninsula Marsh and Upland Habitat Development Site, Galveston Bay, Texas; and Windmill Point Marsh Development Site, James River, Virginia.

The study was conducted as Work Unit 2A10 of the DMRP for the Office, Chief of Engineers, at the U. S. Army Engineer Waterways Experiment Station (WES), Environmental Laboratory (EL), formerly the Environmental Effects Laboratory, Vicksburg, Mississippi.

The report was written by Dr. John W. Simmers, HDP. The study was under the supervision of Dr. Hanley K. Smith, Manager, HDP, and the general supervision of Dr. John Harrison, Chief, EL.

The Directors of WES during the study were COL G. H. Hilt, CE, and COL J. L. Cannon, CE. Technical Director was Mr. F. R. Brown.

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A SURVEY OF POTENTIAL MEDICAL AND VETERINARY DISEASES AT HABITAT DEVELOPMENT FIELD SITES

Introduction

1. The development of marsh and upland habitats from dredged material disposal sites at Bolivar Peninsula, Galveston Bay, Galveston County, Texas; Windmill Point, James River, Prince Georges County, Virginia; and Miller Sands, Columbia River, Clatsop County, Oregon, may affect the localized incidence of selected human and veterinary diseases in these areas. The effect could be an indirect impact of habitat development through the attraction and maintenance of animal populations that serve either as reservoirs or are otherwise involved in the maintenance or transmission of communicable diseases of human or veterinary importance.

2. This report represents an effort to distinguish between the possibility for a communicable disease problem related to habitat development and the probability of a problem related to this activity.

Survey Approach

3. This survey was conducted in three phases; the first phase involved the listing of animal species (both fish and wildlife) associated with the particular habitat development sites. The second phase identified known diseases of human or veterinary importance potentially associated with each animal on the list and the role that the animal fills in the transmission of the disease. For example, a red-winged blackbird (*Agelaius phoeniceus*) can be a reservoir for the virus of western equine encephalitis. If in fact the blackbird were infected with the virus, the disease could be carried to a man or a horse or to other animals by certain species of mosquitoes (*Aedes aegypti* or various *Culex spp.*) which first bite the blackbird and then bite the man. As the reader might judge for himself, the variety of possible diseases a man exposes himself

to through association with natural animal communities is surprising and perhaps upsetting but the actual occurrences of these diseases on the local and state level do not approach the potential. The third phase served then to define, for each disease, the actual localized and statewide occurrence of the diseases listed.

Animal populations at the habitat development sites

4. The list of fauna presented in this report and used to define potential disease interactions was obtained from the Dredged Material Research Program (DMRP), Habitat Development Project (HDP) files and represents two types of information:

a. Listings from baseline field and/or literature faunal inventories for the general locations of proposed habitat development.

b. Listings of fish and wildlife species actually observed at the sites during the early phases of site development.

5. The faunal listings presented are incomplete for the locations discussed but are suggested as adequate for the purpose of defining the relationships that may cause the transmission of disease from animal to animal or animal to man.

Potential disease problems

6. The potential diseases associated with the listed fish and wildlife were identified from reports of state health organizations of Washington, Texas, and Virginia; publications of the U. S. Center for Disease Control; publications of the U. S. Agricultural Research Service; and a general literature review.

Actual disease occurrences

7. The 4-year period from 1971-1975 was studied to identify the actual incidence of the various diseases in the states and in counties adjacent to the locations of the HDP field sites. The same sources used to obtain potential disease information were used to obtain the actual disease incidence data.

Results

Survey

8. The results of the survey are presented in Tables 1-3 according to column headings that are explained below. Tables are designed

for quick reference by site and obvious animal species. Diseases listed are those that may be influenced by habitat management practices to encourage or discourage site use by specific animals. Although these diseases may have been reported from areas near the HDP field sites, none have been reported specifically from the field sites. Finally in order to make the tabulation less confusing, literature references have been omitted and a list of useful secondary literature is given in the bibliography.

Definitions and explanations of column headings within tables

10. The following is an explanation of the headings included in the tables:

a. Host -- An abundant animal at the site and one that might maintain a pathogen (bacteria, virus, etc.) by serving as a reservoir for that pathogen. The host animal may also transfer a pathogen to man or to animals of economic importance to man. When the host animal serves the transfer function, it is called a vector. Host animals are usually vertebrates and the most obvious animals at each field site.

b. Vector or intermediate host -- Certain diseases are directly communicated from one man or animal to another man or animal but most listed in the tables of this report require another animal to link the reservoir and the susceptible host. This other animal is either a vector or an intermediate host or both.

(1) Vector -- A micropredator (a predator that takes only a small bit of nourishment from the prey) that may transfer a pathogen from one susceptible host (reservoir) to another susceptible host. If the pathogen does not further develop or reproduce in the micropredator, then the micropredator is called a vector; if the pathogen develops or reproduces in the micropredator, the micropredator is considered an intermediate host. Usually vectors seek out prey (susceptible hosts) and may transfer pathogens to new host species and new geographical areas.

(2) Intermediate host -- As explained above, the intermediate host may be a vector. The intermediate host may also serve a passive role in disease communication. An animal serving as an intermediate host may be eaten by a susceptible host thereby transferring the pathogen to the susceptible host. A waterborne pathogen may undergo development or reproduction in an intermediate host before returning to the water to infect a

susceptible host. Intermediate hosts are most often lower invertebrates: arthropods (usually insects) and mulluscs (snails or bivalvia).

c. Disease -- May be acute or chronic and generally one of three types: vector-borne diseases, contact diseases, or environmental diseases. For information on most of these diseases, the reader is directed to the Manual of Communicable Diseases, published by the Communicable Disease Center, Atlanta, Georgia.

d. Role of host in disease -- A host animal may serve one or more roles in the communication of human or veterinary disease.

(1) Final susceptible host -- Contains the final development form of the pathogen, usually the infectious form.

(2) Host of micropredators -- An animal supporting micropredators that may serve as vectors or intermediate hosts, e.g., an animal serving as a tick host or flea host.

(3) Intermediate host -- This role is explained above and refers to a host supporting a developing or reproducing stage of a pathogen.

(4) Reservoir host -- An animal that harbors a pathogen at a chronic level and thereby makes the pathogen available to vectors, intermediate hosts, or final hosts.

e. Pathogen -- A living organism such as a virus, bacteria, protozoa, etc., capable of producing disease in a susceptible host.

f. Hosts of economic significance -- Hosts including man that are preferred by micropredatory vectors, or who may consume intermediate hosts or who are otherways susceptible to a disease. Included in this list with man are animals associated with man as domestic animals or pets.

g. Human infections per year -- The average number of infections reported for 1971-1975 from counties adjacent to the HDP field site.

h. Average for state -- The average number of human infections reported for 1971-1975 from the entire adjacent state.

i. Likelihood of occurrence -- An a through d rating of possible occurrence of each disease at each site:

(1) a Reported in county or adjacent counties every year 1971-1975.

(2) b Reported in the state during 1971-1975, but no cases in counties adjacent to HDP field site.

(3) c Reservoir, vector, and/or intermediate host species present, but no cases reported in man.

(4) d Veterinary disease predominantly of wildlife, no human cases.

j. Notes -- A series of notes is appended to each table set to clarify or elaborate on items of special importance.

Table 1

Potential Medical and Veterinary Diseases at Miller Sands

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Oncorhynchus tshawytscha Chinook salmon	None	Bacterial kidney disease	Host	Corny bacterium sp.	Salmonid fishes	0	0	d
		Kidney disease or salmon furculosis		Aeromonas salmonicida				
		Aeromonas disease		Aeromonas liquefaciens	Salmonid fishes, shad			
		Columnaris disease		Chondrococcus sp.	Salmonid fishes			
		Cold water disease		Cytophagia psychrophilia, C. sp.				
		Tail rot, fin rot, hemorrhagic septicemia		Vibrio sp. (not specific)	Many fishes			
	Nanophyletus salmonicola	Canid salmon poisoning	Contains intermediate host	Neorickettsia helminthocea	Dog, carnivores			
Rattus norvegicus Norway rat	Culex tarsalis	Western equine encephalitis	Reservoir mosquito host	Virus	Domestic bird, passerine bird, man, killdeer, horse		2	b
		St. Louis encephalitis					<1	
	Culex pipiens	Western equine encephalitis					2	
		St. Louis encephalitis					<1	
	Culiseta inornata	Western equine encephalitis			Domestic bird, horse, passerine bird, man, killdeer		2	
	Thassus petrolatus	Plague	Flea host reservoir	Yersinia pestis	Man, rodent		0	c
	Dimanus montanus	Plague					0	
	Ornathodoros hermsi	Relapsing fever	Tick host reservoir	Borellia recurrens			<1	
	Dermacentor andersoni	Tick paralysis	Tick host	None	Man, rodent, rabbit, dog, cattle, passerine bird, deer mouse, killdeer		<1	
		Colorado tick fever		Virus			5	b
		Anaplasmosis		Anaplasma marginale		Not reported	Not reported	c
		Rocky Mtn. spotted fever		Rickettsia rickettsii		0	2	b
		Rabies		Virus			0	d
		Tularemia		Pasteurella tularensis			<1	b
		Q. fever		Coxiella burnetii			<1	b

(Continued)

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Table 1 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likeli of Occurr
Rattus norvegicus	*Dermacentor andersoni*	Lymphocytic chloriomeningitis	Tick host	Virus	Man, rodent, rabbit, dog, cattle, passerine bird, deer mouse, killdeer	0	0	
Norway rat (Continued)	(Continued)	Western equine encephalitis	Reservoir tick host				2	
Myocastor coypus	None	None					None	Non
Nutria								
Peromyscus maniculatus	*Dermacentor andersoni*	Tick paralysis	Tick host	None	Man, Norway rat, cattle, rabbit, rodent, dog, passerine bird, killdeer		<1	
Deer mouse		Colorado tick fever		Virus			5	
		Anaplasmosis		*Anaplasma marginale*		Not reported	Not reported	
		Rocky Mtn. spotted fever		*Rickettsia rickettsii*		0	2	
		Rabies		Virus			0	
		Tularemia		*Pasteurella tularensis*			<1	
		Q. fever		*Coxiella burnetii*				
		Brucillosus		*Brucilla* sp.			0	
		Lymphocytic chloriomeningitis	Virus				2	
		Western equine encephalitis	Tick host reservoir	Virus				
	Ornathodoros hermsi	Relapsing fever		*Borrella hermsii*	Man, Norway rat, Townsend's vole, rodent, domestic bird, passerine bird, killdeer		<1	
	Culex tarsalis	Western equine encephalitis	Mosquito host reservoir	Virus	Man, horse, Norway rat, passerine bird, domestic bird, killdeer		2	
	Culex pipiens				Man, Norway rat, passerine bird, domestic bird, killdeer, horse			
	Culiseta inornata				Man, horse, Norway rat, passerine bird, domestic bird, killdeer		0	
Branta canadensis	None	Avian botulism	Host	*Clostridium* sp.	Aquatic bird			
Canada goose	Simulid fly	Leucocytozoonosis		*Leucocytozoon* sp.	Aquatic bird, passerine bird			
Anas platyrhynchos	None	Avian botulism		*Clostridium* sp.	Aquatic bird			
Mallard	Simulid fly	Leucocytozoonosis		*Leucocytozoon* sp.	Aquatic bird, passerine bird			
	Ceratopogonid fly							

(Continued)

Table 1 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
haradrius voiciferus illdeer	Culex tarsalis	Western equine encephalitis	Mosquito host reservoir	Virus	Man, horse, rodent, passerine bird, domestic bird	0	2	b
		St. Louis encephalitis					<1	
	Culex pipiens	Western equine encephalitis					2	
		St. Louis encephalitis					<1	
	Culiseta incrnata	Western equine encephalitis					2	
	Dermacentor andersoni	Tick paralysis	Tick host	None	Man, Norway rat, cattle, rabbit, rodent, dog, passerine bird		<1	
		Colorado tick fever		Virus			5	
		Anaplasmosis		Anaplasma marginale		Not reported	Not reported	c
		Rocky Mtn. spotted fever		Rickettsia rickettsii		0	2	b
		Rabies		Virus			0	d
		Tularemia		Pasteurella tularensis			<1	b
		Q. fever		Coxiella burnetii				
		Brucillosus		Brucilla sp.				
		Lymphocytic chloriomeningitis	Virus				0	c
		Western equine encephalitis	Tick host reservoir	Virus			2	b
	Ornathodoros hermsi	Relapsing fever		Borrella hermsii	Man, Norway rat, Townsend's vole, rodent, domestic bird, passerine bird		<1	
orvus brachyrhynchos ommon crow	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, domestic bird, passerine bird		2	
		Q. fever		Coxiella brunetii			<1	
		Tularemia		Pasteurella tularensis				b
		California encephalitis		Virus			0	c
		Rickettsia disease		Rickettsia canada			0	c
		Western equine encephalitis	Tick host, mosquito host reservoir	Virus	Man, passerine bird		2	b
	Culex tarsalis		Mosquito host reservoir		Man, horse, Norway rat, passerine bird, domestic bird, killdeer		2	b

(Continued)

Table 1 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Corvus brachyrhynchos Common crow (Continued)	Culex pipiens	Western equine encephalitis	Mosquito host reservoir	Virus	Man, Norway rat, passerine bird, domestic bird, killdeer, horse	0	2	b
	Culiseta inornata				Man, horse, Norway rat, passerine bird, domestic bird, killdeer			
	Simulid fly ?	Avian trypanosomiasis	Host	Trypanosoma sp.	Passerine bird, aquatic bird		0	d
		Leucocytozoonosis		Leucocytozoon sp.				
	Ceratopogonid fly							
	Simulid fly							
Turdus migratorius Robin		Avian trypanosomiasis		Trypanosoma avium	Passerine bird, domestic bird			
				Trypanosoma sp.	Passerine bird ?			
	Mosquito sp. ?	Filariasis	Host ?	Microfilaria sp.	Bird ?			
	Ceratopogonid fly	Leucocytozoonosis	Host	Leucocytozoon sp.	Aquatic bird, passerine bird			
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Passerine bird, domestic bird, man, rabbit		2	b
		Q. fever		Coxiella burnetii			<1	
		Tularemia		Pasteurella tularensis			<1	
		California encephalitis		Virus			0	c
		Rickettsia disease		Rickettsia canada			0	c
		Western equine encephalitis		Virus			2	b
	Ornathodoros hermsi	Relapsing fever	Tick host reservoir	Borrelia hermsii	Man, Norway rat, Townsend's vole, rodent, domestic bird, passerine bird, killdeer		<1	
	Culex tarsalis	Western equine encephalitis	Mosquito host reservoir	Virus	Man, horse, Norway rat, passerine bird, domestic bird, killdeer		2	

(Continued)

(Sheet 4

Table 1 (Concluded)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence	N
urdus migratorius	Culex pipiens	Western equine encephalitis	Mosquito host reservoir	Virus	Man, Norway rat, passerine bird, domestic bird, killdeer, horse	0	2	b	
obin (Continued)	Culiseta inornata				Man, horse, Norway rat, passerine bird, domestic bird, killdeer		2	b	

Table 1: Notes, Miller Sands

1. These diseases are related to water temperature; water temperature should not be increased.

2. A rickettsial disease carried by a fluke in a fish.

3. An average of seven cases per year of rabies in wild animals occurs in the state.

4. There are no significant medical or veterninary diseases currently known to be related to nutria.

5. Avian botulism can be exceptionally harmful to populations of waterfowl during periods of drought.

6. Leucocytozoonosis may be fatal to immature waterfowl.

7. Undoubtedly there are many infected birds. This is a common disease, but only occasionally reported.

Table 2

Potential Medical and Veterinary Diseases at Bolivar Peninsula

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Dasypus novemcinctus Armadillo	*Amblyomma americanum*	Tularemia	Tick host	*Pasteurella tularensis*	Man, cattle, swine, sheep, horse,	1	12	a
		Rocky Mtn. spotted fever		*Rickettsia rickettsii*	cat, goat, rabbit, chicken	2	18	a
		Q. fever		*Coxiella burnetii*		0	0	c
		Tick paralysis		None				
	Triatoma protracta	Chagas' disease	Tick host, bug host reservoir	*Schizotrypanum cruzi*	Man, cotton rat, house mouse, opossum, goat, cattle, dog, cat, swine, horse, raccoon			
	T. rubida							
	T. gerstaeckeri							
	T. heidemanni							
	T. longipes							
	T. sanguisuga							
	T. megista							
	Rhodinus prolixus							
	Reduvius personatus							
	Melanolestes picipes							
	Panstrongylus megistus							
	Erutryus sp.							
	Ornathodoros turicata							
	None	Leprosy	Host reservoir?	*Mycobacterium leprae*	Man	3	24	a
Procyon lotor Raccoon	*Triatoma protracta*	Chagas' disease	Tick host, bug host reservoir	*Schizotryponum cruzi*	Man, cotton rat, house mouse, opossum, goat, cattle, dog, cat, swine, horse, armadillo	0	c	c
	T. rubida							
	T. gerstaeckeri							
	T. heidemanni							
	T. longipes							
	T. sanguisuga							
	T. megista							
	Rhodinus prolixus							
	Reduvius personatus							
	Melanolestes picipes							
	Panstrongulus megistus							
	Erutyrus sp.							
	Ornathodoros turicata							
	Amblyomma maculatum	Leptospirosis	Tick host	*Leptospira pomona*	Man, dog, cat, horse,	2	5	a
		Rickettsia-like fever		*Rickettsia* sp.	cattle, goat, sheep	0	0	c
	Dermacentor variabilis	Rocky Mtn. spotted fever		*Rickettsia rickettsii*	Man, dog, cattle, horse, cat, swine,	2	18	a
		Tularemia		*Pasteurella tularensis*	house mouse, cotton rat, rabbit, passerine bird	1	12	a
		Anaplasmosis		*Anaplasma marginale*		0	0	c
		Colorado tick fever		Virus		0	0	d
		Tick paralysis		None				
		St. Louis encephalitis		Virus		7	8	a

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Procyon lotor	Ixodes scapularis	Tularemia	Tick host	Pasteurella tularensis	Man, rabbit, dog, cattle	1	12	a
Raccoon (Continued)		Anaplasmosis	Tick host	Anaplasma marginale	↓	0	0	c
Mus musculus	Tenebrionid beetles	Tapeworm infection	Definitive host and reservoir	Hymenolepis nana	Man	Not reported	↓	↓
House mouse	Notopsullus fasciatus	↓	↓	↓	↓	↓	↓	↓
	Xenopsylla cheopis							
	None	Toxoplasmosis	Reservoir,	Toxoplasma gondii	Man, rodent, domestic animals	0	↓	↓
	Amblyomma americanum	Tularemia	Tick host	Pasteurella tularensis	Man, rabbit, cattle, sheep, swine,	1	12	a
		Rocky Mtn. spotted fever	↓	Rickettsia rickettsii	horse, cat, goat, chicken	2	18	a
		Q-fever		Coxiella burnetii	↓	0	0	c
		Tick paralysis		None		↓	↓	↓
	Dermacentor variabilis	Tick paralysis	Tick host	None	Man, dog, cattle,			
		Rocky Mtn. spotted fever	↓	Rickettsia rickettsii	horse, cat, swine, cotton rat	2	18	a
		St. Louis encephalitis		Virus	↓	7	8	a
		Tularemia		Pasteurella tularensis		10		
		Anaplasmosis		Anaplasma marginale		0	0	c
		Colorado tick fever		Virus		↓	0	c
	Ornithodoros bacoti	Endemic typhus (Texas strain)	Tick host reservoir	Rickettsia sp.	Man, cotton rat		20	b
		Rickettsial pox		Rickettsia akari			↓	↓
	Allodermanyssus sanguineus	Rickettsial pox	Mite host reservoir	Rickettsia akari	Man			
	Triatoma protracta	Chagas' disease	Reservoir	Schizotrypanum cruzi	Man, dog, cat, swine, horse, goat, opossum, raccoon, cattle, cotton rat, armadillo			
	T. rubida	↓	↓	↓	↓			
	T. gerstaeckeri							
	T. heidemanni							
	T. longipes							
	T. sanguisuga							
	T. megista							
	Rhodinus prolixus							
	Reduviius personatus							
	Melanolestes picipes							
	Panstrongylus megistus							
	Erutyrus sp.							
	Ornathodoros turicata							
	Aedes aegypti	Western equine encephalitis		Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	b

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Mus musculus House mouse (Continued)	Aedes sollicitans	Eastern equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine birds	0	<1	
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	
	Culex tarsalis	Western equine encephalitis				0	<1	
		St. Louis encephalitis				7	8	
Sigmodon hispidus Cotton rat	Amblyomma americanum	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, cattle, swine, dog, cat, sheep, horse, goat, rabbit, house mouse	2	10	
		Q. fever		Coxiella burnetii		0	0	
		Tularemia		Pasteurella tularensis		1	12	
		Tick paralysis		None		0	0	
	Amblyomma maculatum	Leptospirosis	Tick host	Leptospira pomona	Man, dog, cat, horse, cattle, sheep, raccoon, cotton rat	2	5	
		Rickettsia-like fever		Rickettsia sp.?		0	0	
	Ornithodoros talaje	Relapsing fever		Borella neotropicus	Man, opossum, Norway rat, black rat, horse, swine, cattle			
		Q. fever		Coxiella burnetii				
	Dermacentor variabilis	Tick paralysis		None	Man, dog, cattle, horse, cat, swine, house mouse			
		Rocky Mtn. spotted fever		Rickettsia rickettsii		2	18	
		Colorado tick fever		Virus		0	0	
		Tularemia		Pasteurella tularensis		1	12	
		St. Louis encephalitis		Virus		7	8	
		Anaplasmosis		Anaplasma marginale		0	0	
	Ixodes dentatus	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, Norway rat, rabbit, chicken	2	18	
		Tularemia		Pasteurella tularensis		1	12	
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Black rat, swamp rabbit, passerine and domestic bird	2	18	
		Q. fever		Coxiella burnetii		0	0	
		Tularemia		Pasteurella tularensis		1	12	
		Western equine encephalitis		Virus		0	<1	
		California encephalitis				0	0	

(Continued)

Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Sigmodon hispidus Cotton rat (Continued)	*Haemaphysalis leporis-palustris* (Continued)	Rickettsia disease		*Rickettsia canada*		0		
	Ixodes scapularis	Tularemia	Tick host	*Pasteurella tularensis*	Man, dog, cattle, Norway rat	1	12	
		Anaplasmosis		*Anaplasma marginale*		0	0	
		Relapsing fever		*Borella neotropicus*				
		Q. fever		*Coxiella burnetii*				
	Ornithodoros bacoti	Endemic typhus (Texas strain)	Tick host reservoir	*Rickettsia* sp.	Man, house mouse		20	
		Rickettsial pox		*Rickettsia akari*			0	
	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	
	Culex tarsalis	Western equine encephalitis				0	<1	
		St. Louis encephalitis				7	8	
Sylvilagus aquaticus Swamp rabbit	*Amblyomma americanum*	Rocky Mtn. spotted fever		*Rickettsia rickettsii*	Man, cattle, dog, cat, swine, sheep, horse, goat, rabbit, house mouse	2	18	
		Tularemia		*Pasteurella tularensis*		1	12	
		Q. fever		*Coxiella burnetii*		0	0	
		Tick paralysis		None		0	0	
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever	Tick host	*Rickettsia rickettsii*	Black rat, cotton rat, passerine bird, domestic bird	2	18	
		Q. fever		*Coxiella burnetii*		0	0	
		Tularemia	Reservoir	*Pasteurella tularensis*		1	12	
		Western equine encephalitis		Virus		0	<1	
		California encephalitis	Tick host				0	
	Aedes sollicitans	Eastern equine encephalitis	Reservoir		Man, cotton rat, passerine bird, domestic bird, opossum, goat		<1	
Capra hircus Goat	*Argas persicus*	Avian spirochaetes	Tick host	*Spirochaeta* sp.	Man, duck, chicken, pigeon	--	--	

(Continued)

Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Capra hiracus	Argas persicus	Fowl cholera	Tick host	Pasteurella avicida	Man, duck, chicken,	--	--	d
Goat (Continued)	(Continued)	Fowl paralysis		None	pigeon	--	--	d
		Anthrax		Bacillis anthracis		0	0	c
		Fowl relapsing fever		Borella sp.				
		Human relapsing fever		Borella neotropicus				
		Endemic typhus		Rickettsia			20	b
		Yellow fever		Charon cunagatus			0	c
		Tetanus		Clostridium tetanii		?	11	a
		Western equine encephalitis		Virus		0	<1	b
	Amblyomma americanum	Tularemia		Pasteurella tularensis	Man, cattle, sheep, cat, horse, swine,	1	12	a
		Rocky Mtn. spotted fever		Rickettsia rickettsii	chicken, rabbit, armadillo, house	2	18	a
		Q. fever		Coxiella burnetii	mouse, cotton rat	0	0	c
		Tick paralysis		None		0	0	c
	Amblyomma maculatum	Leptospirosis		Leptospora pomona	Man, dog, cat, horse,	2	5	a
		Rickettsia-like fever		Rickettsia sp.	cattle, sheep, raccoon, cotton rat	0	0	c
	Dermacentor andersoni	Tick paralysis		None	Man, rabbit, cattle,			
		Colorado tick fever		Virus	rodent			
		Anaplasmosis		Anaplasma marginale				
		Rocky Mtn. spotted fever		Rickettsia rickettsii		2	18	a
		Rabies		Virus		0	<1	c
		Tularemia		Pasteurella tularensis		1	12	a
		Rickettsia diaportica infection		Rickettsia diaportica		0	0	c
		Q. fever		Coxiella burnetii			0	c
		Western equine encephalitis	Reservoir	Virus			<1	b
		Brucilosis		Brucilla sp.		12		
		Lymphocytic choriomeningitis				0	0	c
	Aedes sollicitans	Eastern equine encephalitis	Reservoir	Virus	Man, passerine bird, horse		<1	
	Triatoma protracta	Chagas' disease		Schizotrypanum cruzi	Man, cotton rat,		0	c
	T. rubida				opossum, raccoon,			
	T. gerstaecheri				armadillo, cattle,			
	T. heidemanni				swine, dog, cat,			
	T. longipes				horse, house mouse			
	T. sanguisuga							
	T. sp.							
	Rhodnius prolixus							
	Reduvius personatus							

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Table 7 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Capra hiracus Goat (Continued)	*Melanolestes picipes* *Panstrongylus megistus* *Erutyrus* sp. *Ornithodoros turicata*	Chagas' disease	Reservoir	*Schizotrypanum cruzi*	Man, cotton rat, opossum, raccoon, armadillo, cattle, swine, dog, cat, horse, house mouse	0	0	c
Anhinga anhinga Anhinga	*Argas persicus*	Avian spirochaets	Tick host	*Spirochaeta* sp.	Man, goat, domestic bird, barn swallow			d
		Fowl cholera		*Pasteurella avicida*				
		Fowl paralysis		None				c
		Anthrax		*Bacillus anthracis*				d
		Fowl relapsing fever		*Borellia* sp.				
		Human relapsing fever		*Borellia neotropicus*				c
		Endemic typhus (Texas strain)		*Rickettsia* sp.			20	b
		Plague		*Yersinia pestis*			10	c
		Brucillosus		*Brucilla* sp.		<1	23	b
		Yellow fever		*Charon evagatus*		0	0	c
		Tetanus		*Clostridium tetani*		?	11	a
		Western equine encephalitis		Virus		0	<1	b
Charadrius vociferus Killdeer	*Amblyomma maculatum*	Leptospirosis		*Leptospira pomona*	Man, dog, cat, horse, cattle, sheep, goat, raccoon, cotton rat, passerine bird	2	5	a
		Rickettsia-like fever		*Rickettsia* sp.		0	0	c
	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	b
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likeli... Occurr...
Coccyrus americanus Yellow-billed cuckoo (Continued)	Aedes sollicitans	Eastern equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	
	Culex tarsalis	Western equine encephalitis				0	<1	
		St. Louis encephalitis				7	8	
Myiarchus crinitus Great crested flycatcher	Amblyomma americanum	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, cattle, sheep, swine, horse, cat, rabbit, cotton rat, house mouse, armadillo, domestic bird, wild bird	2	18	
		Tularemia		Pasteurella tularensis		1	12	
		Q. fever		Coxiella burnetii		0	0	
		Tick paralysis		None				
Hirundo rustica Barn swallow	Argas persicus	Avian spirochaetes		Spirochaeta sp.	Man, goat, mourning dove, domestic bird			
		Fowl cholera		Pasteurella avicida				
		Fowl paralysis		None				
		Anthrax		Bacillus anthracis				
		Fowl relapsing fever		Borriella sp.				
		Human relapsing fever		Borriella neotropicus				
		Endemic typhus (Texas strain)		Rickettsia sp.			20	
		Plague		Yersinia pestis			0	
		Yellow fever		Charon evagatus			0	
		Tetanus		Clostridium tetani		?	11	
		Western equine encephalitis		Virus		0	<1	
	Ixodes brunneus	Fowl paralysis		None	Passerine bird	0	0	
Corvus brachyrynchos Crow	Amblyomma americanum	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, cattle, sheep, horse, swine, cotton rat, opossum, armadillo, house mouse, raccoon, passerine bird	2	18	
		Tularemia		Pasteurella tularensis		1	12	
		Q. fever		Coxiella brunetii		0	0	
		Tick paralysis		None			0	
		Western equine encephalitis	Reservoir	Virus			<1	
		St. Louis encephalitis				7	8	
	Aedes aegypti	Western equine encephalitis			Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	

(Continued)

Crow (Continued)	Aedes sollicitans	Eastern equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	7	8
	Culex pipiens	Western equine encephalitis Eastern equine encephalitis St. Louis encephalitis				7	8
	Culex tarsalis	Western equine encephalitis St. Louis encephalitis				7	8
	Dermacentor variabilis	Rocky Mtn. spotted fever Q fever Tularemia	Tick	Rickettsia rickettsii Coxiella burnetii Pasteurella tularensis	Meadow rat, rat, black rat, domestic bird, passerine bird	1	1
		Western equine encephalitis St. Louis encephalitis		Virus		0	<1
Mimus polyglottos Mockingbird	Anopheles quadrimaculatus Culex pipiens C. tarsalis	Avian malaria		Plasmodium relictum	Passerine bird, mourning dove		
	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	7	8
	Aedes sollicitans	Eastern equine encephalitis					
	Culex pipiens	Western equine encephalitis Eastern equine encephalitis St. Louis encephalitis				7	8
	Culex tarsalis	Western equine encephalitis St. Louis encephalitis				7	<1

(Continued)

Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Mimus polyglottos	Amblyomma americanum	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, cattle, sheep, horse, swine, cotton rat, opossum, armadillo, house mouse, raccoon, passerine bird	2	18	a
Mockingbird (Continued)		Tularemia		Pasteurella tularensis		1	12	a
		Q. fever		Coxiella burnetii		0	0	c
		Tick paralysis		None		0	0	c
	Amblyomma maculatum	Leptospirosis		Leptospira pomona	Man, passerine bird, dog, cat, cattle, horse, goat, sheep, rabbit, raccoon, cotton rat	2	5	a
		Rickettsia-like fever		Rickettsia sp.		0	0	c
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Cotton rat, cat, black rat, domestic bird, passerine	2	18	a
		Q. fever		Coxiella burnetii		0		
		Tularemia		Pasteurella tularensis		1	12	a
		Western equine encephalitis	Reservoir	Virus		0	<1	b
		California encephalitis					0	c
		Rickettsia canada disease		Rickettsia canada				c
Toxostoma rufum	Culicid fly	Avian malaria	Host	Plasmodium sp.	Passerine bird			d
Brown thrasher	Simulid fly	Haemoproteus infection		Haemoproteus sp.				
	Simulid fly	Leucocytozoonosis		Leucocytozoon sp.				
	Culicid fly	Filariasis		Microfilaria sp.				
	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	b
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis						
	Culex pipiens Aedes sollicitans	St. Louis encephalitis			Man, house mouse, cotton rat, passerine bird, domestic bird	7	8	a

(Continued)

Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
...oxostoma rufum	Amblyomma americanum	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, cattle, dog, sheep, horse,	2	18	a
...own thrasher (Continued)		Tularemia		Pasteurella tularensis	swine, cat, goat, house mouse, cotton	1	12	a
		Q. fever		Coxiella burnetii	rat, armadillo,	0	0	c
		Tick paralysis		None	raccoon, domestic bird	0	0	c
	Amblyomma maculatum	Leptospirosis		Leptospira pomona	Man, dog, cat, horse,	2	5	a
		Rickettsia-like fever		Rickettsia sp.	cattle, goat, sheep, raccoon, cotton rat, passerine bird	0	0	c
	Ixodes brunneus	Wild bird paralysis		None	Passerine bird	0	0	d
	Ixodes dentatus	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, rabbit, Norway rat, cotton rat,	2	18	a
		Tularemia		Pasteurella tularensis	passerine bird	1	12	
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird,	2	18	
		Tularemia		Pasteurella tularensis	passerine bird	1	12	
		Q. fever		Coxiella burnetii		0	0	c
		Rickettsia canada disease		Rickettsia canada				
		Western equine encephalitis		Virus				
		California encephalitis						
Turdus migratorius	Simulid fly	Leucocytozoonosis	Host	Leucocytozoon sp.	Passerine bird			d
Robin	↑	Trypanosomiasis		Trypanosoma avum				
	Simulid fly	Haemoproteus infection		Haemoproteus sp.				
	Culicid fly	Filariasis		Microfilaria sp.				
	Anopheles quadrimaculatus	Avian malaria		Plasmodium reticulatum	Passerine bird, mourning dove			
	Culex pipiens C. tarsalis							
	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	b
	Aedes sollicitans	Eastern equine encephalitis					<1	b

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Turdus migratorius Robin (Continued)	*Culex pipiens*	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	b
		Eastern equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
	Ixodes brunneus	Wild bird paralysis	Tick host	None	Passerine bird	0	0	d
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		*Rickettsia rickettsii*	Rabbit, cotton rat, cat, domestic bird, passerine bird	2	18	a
		Q. fever		*Coxiella burnetii*		0	0	c
		Tularemia		*Pasteurella tularensis*		1	12	a
		Rickettsia canada disease		*Rickettsia canada*		0	0	c
		Western equine encephalitis	Reservoir	Virus			<1	b
		California encephalitis					0	c
Polioptila caerulea Blue-gray gnatcatcher	*Haemaphysalis leporis-palustris*	Rocky Mtn. spotted fever	Tick host	*Rickettsia rickettsii*		2	18	a
		Q. fever		*Coxiella burnetii*		0	0	c
		Tularemia		*Pasteurella tularensis*		1	12	a
		Rickettsia canada disease		*Rickettsia canada*		0	0	c
		Western equine encephalitis	Reservoir	Virus			<1	b
		California encephalitis					0	c
	Aedes aegypti	Western equine encephalitis			Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	b
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	a

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likeli... of Occurr...
Poliortila caerulea	Culex tarsalis	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	
Blue-gray gnatcatcher (Continued)		St. Louis encephalitis				7	8	
Regulus calendula	Ixodes brunneus	Wild bird paralysis	Tick host	None	Passerine bird	0	0	
Ruby-crowned kinglet	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	
	Culex tarsalis	Western equine encephalitis				0	<1	
		St. Louis encephalitis				7	8	
Anthus spinoletta	Ixodes brunneus	Wild bird paralysis	Tick host	None	Passerine bird	0	0	
Water pipit	Aedes sollicitans	Eastern equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	
	Culex tarsalis	Western equine encephalitis				0	<1	
		St. Louis encephalitis				7	8	
Lanius ludovicianus	Amblyomma americanum	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, cattle, dog, sheep, horse,	2	18	
Loggerhead shrike		Tularemia		Pasteurella tularensis	swine, cat, goat, house mouse, cotton rat, armadillo, raccoon, domestic bird, passerine bird	1	12	
		Q. fever		Coxiella burnetii		0	0	
		Tick paralysis		None		0	0	

(Continued)

Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Lanius ludovicianus Loggerhead shrike (Continued)	Amblyomma maculatum	Leptospirosis	Tick host	Leptospira pomona	Man, dog, cat, horse, cattle, goat, sheep, raccoon, cotton rat, passerine bird	2	5	a
		Rickettsia-like fever		Rickettsia sp.		0	0	c
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird, passerine bird	2	18	a
		Q. fever		Coxiella burnetii		0	0	c
		Tularemia		Pasteurella tularensis		1	12	a
		Rickettsia canada disease		Rickettsia canada		0	0	c
		Western equine encephalitis		Virus			<1	b
		California encephalitis					0	c
	Aedes aegypti	Western equine encephalitis	Reservoir		Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	b
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
Seiurus motacilla Louisiana waterthrush	Amblyomma americanum	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, cattle, dog, sheep, horse, swine, cat, goat, house mouse, cotton rat, armadillo, raccoon, domestic bird, passerine bird	2	18	
		Tularemia		Pasteurella tularensis		1	12	
		Q. fever		Coxiella burnetii		0	0	c
		Tick paralysis		None				c
	Ixodes brunneus	Wild bird paralysis		None	Passerine bird			d
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird, passerine bird	2	18	a
		Q. fever		Coxiella burnetii		0	0	c
		Tularemia		Pasteurella tularensis		1	12	a
		Rickettsia canada disease		Rickettsia canada		0	0	c

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Table . (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Seiurus motacilla	Haemaphysalis leporis-palustris (Continued)	Western equine encephalitis	Reservoir	Virus	Rabbit, cotton rat, cat, domestic bird, passerine bird	0	<1	b
Louisiana waterthrush (Continued)		California encephalitis					0	c
	Aedes aegypti	Western equine encephalitis			Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	b
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
Sturnella magna	Amblyomma americanum	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, cattle, dog, sheep, horse, swine, cat, goat, house mouse, cotton rat, armadillo, raccoon, domestic bird, passerine bird	2	18	
Eastern meadowlark		Tularemia		Pasteurella tularensis		1	12	
		Q. fever		Coxiella burnetii		0	0	c
		Tick paralysis		None		0	0	c
	Amblyomma maculatum	Leptospirosis	Tick host	Leptospira pomona	Man, dog, cat, horse, cattle, goat, sheep, raccoon, cotton rat, passerine bird	2	5	a
		Rickettsia-like fever		Rickettsia sp.		0	0	c
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird, passerine bird	2	18	a
		Q. fever		Coxiella burnetii		0	0	c
		Tularemia		Pasteurella tularensis		1	12	a
		Rickettsia canada		Rickettsia canada		0	0	c
		[illegible]		Virus			<1	b
		[illegible]					0	c
		Canine encephalitis						
	Culex pipiens	Avian malaria	Host	Plasmodium hexamerium	Passerine bird		0	d
	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	b

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Sturnella magna	Aedes sollicitans	Eastern equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	b
Eastern meadowlark (Continued)								
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
Agelaius phoeniceus	Amblyomma americanum	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, cattle, dog, sheep, horse,	2	18	a
Red-winged blackbird		Q. fever		Coxiella burnetii	swine, cat, goat,	0	0	c
		Tularemia		Pasteurella tularensis	house mouse, cotton rat, armadillo,	1	12	a
		Tick paralysis		None	raccoon, domestic bird, passerine bird	0	0	c
	Amblyomma maculatum	Leptospirosis	Tick host	Leptospira pomona	Man, dog, cat, horse,	2	5	a
		Rickettsia-like fever		Rickettsia sp.	cattle, goat, sheep, raccoon, cotton rat, passerine bird	0	0	c
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird, passerine bird	2	18	a
		Q. fever		Coxiella burnetii		0	0	c
		Tularemia		Pasteurella tularensis		1	12	a
		Rickettsia canada disease		Rickettsia canada		0	0	c
		Western equine encephalitis	Reservoir	Virus			<1	b
		California encephalitis					0	c
	Dermacentor variabilis	Tick paralysis	Tick host	None	Man, dog, cattle,		0	c
		Rocky Mtn. spotted fever		Rickettsia rickettsii	horse, cat, house mouse, cotton rat,	2	18	a
		Tularemia		Pasteurella tularensis	raccoon, opossum, cowbird	1	12	a
		Anaplasmosis		Anaplasma marginale		0		
		Colorado tick fever		Virus		0	0	c
		St. Louis encephalitis				7	8	a

(Continued)

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Agelaius phoeniceus	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	b
Red-winged blackbird (Continued)	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
	Culex pipiens	Avian malaria	Host	Plasmodium relictum P. cathemerium P. elongatum P. hexamerium P. sp.	Passerine bird	0	0	d
	Simulid fly	Haemoproteus infection		Haemoproteus sp.				
	Simulid fly	Leucocytozoonosis		Leucocytozoon sp.				
	Simulid fly	Trypanosomiasis		Trypanosoma avium				
	Mosquito	Filariasis		Microfilaria sp.				
Quiscalus quiscula	Amblyomma maculatum	Leptospirosis	Tick host	Leptospira pomona	Man, dog, cat, horse, cattle, goat, sheep, raccoon, cotton rat, passerine bird	2	5	a
Common grackle		Rickettsia-like fever				0	0	c
	Ixodes brunneus	Wild bird paralysis		None	Passerine bird	0	0	d
	Ixodes dentatus	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, passerine bird, domestic bird, rabbit, Norway rat, cotton rat	2	18	a
		Tularemia		Pasteurella tularensis		1	12	
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird, passerine bird	2	18	
		Q. fever		Coxiella burnetii		0	0	c
		Tularemia		Pasteurella tularensis		1	12	a
		California encephalitis	Reservoir	Virus		0	0	c
		Western equine encephalitis				0	<1	b

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Quiscalus quiscula	*Aedes aegypti*	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	b
Common grackle (Continued)	*Aedes sollicitans*	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
	Culex pipiens Other mosquitoes	Avian malaria	Host	*Plasmodium relictum* *P. cathmerium* *P. elongatum* *Plasmodium* sp.	Passerine bird	0	0	d
	Simulid fly	*Haemoproteus* infection		*Haemoproteus* sp.				
	Simulid fly	Leucocytozoonosis		*Leucocytozoon* sp.				
	Simulid fly	Avian trypanosomiasis		*Trypanosoma avium*				
	Mosquito	Filariasis		*Microfilaria* sp.				
Molothrus ater	*Amblyomma maculatum*	Leptospirosis	Tick host	*Leptospira pomona*	Man, dog, horse, cattle, goat, sheep, raccoon, cotton rat, passerine bird	2	5	a
Brown-headed cowbird		Rickettsia-like fever		*Rickettsia* sp.		0	0	c
	Dermacentor variabilis	Tick paralysis		None	Man, dog, cattle, horse, cat, swine, house mouse, cotton rat, raccoon, opossum, red-winged blackbird	0	0	c
		Rocky Mtn. spotted fever		*Rickettsia rickettsii*		2	18	a
		Tularemia		*Pasteurella tularensis*		1	12	a
		Anaplasmosis		*Anaplasma marginale*		0	0	c
		Colorado tick fever		Virus		0	0	c
		St. Louis encephalitis	Reservoir			7	8	a
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever	Tick host	*Rickettsia rickettsii*	Rabbit, cotton rat, cat, domestic bird, passerine bird	2	18	a
		Q. fever		*Coxiella burnetii*		0	0	c
		Tularemia		*Pasteurella tularensis*		1	12	a
		California encephalitis	Reservoir	Virus	Virus	0	0	c
		Western equine encephalitis				0	<1	b

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Molothrus ater	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	b
Brown-headed cowbird (Continued)								
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
	Culex pipiens other mosquitoes	Avian malaria		Plasmodium relictum P. circumflexum P. hexamerium P. sp.	Passerine bird	0	0	d
	Simulid fly	Haemoproteus infection	Host	Haemoproteus sp.				
	Simulid fly	Leucocytozoonosis		Leucocytozoon sp.				
	Simulid fly	Avian trypanosomiasis		Trypanosoma avium				
Guiraca caerulea	Simulid fly	Avian trypanosomiasis		Trypanosoma avium				
Blue grosbeak	Amblyomma americanum	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, cattle, dog, sheep, horse,	2	18	a
		Q. fever		Coxiella burnetii	swine, cat, cotton rat, house mouse, goat	0	0	c
		Tick paralysis		None	Raccoon, armadillo,	0	0	c
		Tularemia		Pasteurella tularensis	domestic bird, passerine bird	1	12	a
Passerculus sandwichensis	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird,	2	18	a
Savannah sparrow		Q. fever		Coxiella burnetii	passerine bird	0	0	c
		Tularemia		Pasteurella tularensis		1	12	a
		California encephalitis	Reservoir	Virus		0	0	c
		St. Louis encephalitis				7	8	a
	Aedes aegypti	Western equine encephalitis			Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	b

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Passerculus sandwichensis Savannah sparrow (Continued)	Aedes sollicitans	Eastern equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird	0	<1	b
	Culex pipiens	Western equine encephalitis Eastern equine encephalitis St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
Ammodramus savannarum Grasshopper sparrow	Amblyomma americanum	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, cattle, swine, sheep, horse, cat,	2	18	a
		Q. fever		Coxiella burnetii	goat, rabbit,	0	0	c
		Tick paralysis		None	chicken	0	0	c
		Tularemia		Pasteurella tularensis		1	12	a
	Amblyomma maculatum	Leptospirosis		Leptospira pomona	Man, dog, horse, cattle, goat, sheep, raccoon, cotton rat, passerine bird	2	5	a
		Rickettsia-like fever		Rickettsia sp.		0	0	c
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird, passerine bird	2	18	a
		Q. fever		Coxiella burnetii		0	0	c
		Tularemia		Pasteurella tularensis		1	12	a
		California encephalitis	Reservoir	Virus		0	0	c
		Western equine encephalitis					<1	b
	Aedes aegypti	Western equine encephalitis			Man, horse, house mouse, cotton rat, domestic bird, passerine bird			
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis Eastern equine encephalitis St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Passerculus gramineus	*Dermacentor andersoni*	Tick paralysis	Tick host	None	Man, rabbit, dog, goat, cattle, passerine bird, cotton rat, house rat	0	0	c
Vesper sparrow		Colorado tick fever		Virus				
		Anaplasmosis		*Anaplasma marginale*				
		Rocky Mtn. spotted fever		*Rickettsia rickettsii*		2	18	a
		Rabies		Virus		0	<1	c
		Tularemia		*Pasteurella tularensis*		1	12	a
		Rickettsia diaportica infection		*Rickettsia diaportica*		0	0	c
		Q. fever		*Coxiella burnetii*		0	0	c
		Brucillosus		*Brucilla* sp.		<1	23	b
		Lymphocytic-chloriomeningitis		Virus		0	0	c
		Western equine encephalitis					<1	b
	Aedes aegypti	Western equine encephalitis	Reservoir		Man, horse, house mouse, cotton rat, domestic bird, passerine bird			
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis				0	<1	b
		St. Louis encephalitis				7	8	a
Spizella passerinea	*Amblyomma americanum*	Rocky Mtn. spotted fever	Tick host	*Rickettsia rickettsii*	Man, cattle, swine, sheep, horse, cat, goat, rabbit, chicken	2	18	
Chipping sparrow		Tularemia		*Pasteurella tularensis*		1	12	
		Tick paralysis		None		0	0	c
	Amblyomma maculatum	Leptospirosis		*Leptospira pomona*	Man, dog, horse, cattle, goat, sheep, raccoon, cotton rat, passerine bird	2	5	a
		Rickettsia-like fever		*Rickettsia* sp.		0	0	c
	Mosquito sp?	Filariasis	Host	*Microfilaria* sp.	Passerine bird			d
	Ixodes brunneus	Wild bird paralysis	Tick host	None				
Spizella pusilla	*Ixodes brunneus*							
Field sparrow								

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Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likeli... of Occurr...
Spizella pusilla	Ixodes dentatus	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, rabbit, Norway rat, passerine	2	18	n
Field sparrow		Tularemia		Pasteurella tularensis	bird, cotton rat	1	12	
(Continued)	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird,	2	18	
		Q. fever		Coxiella burnetii	passerine bird	0	0	
		Tularemia		Pasteurella tularensis		1	12	n
		California encephalitis		Virus		0	0	
		Western equine encephalitis	Reservoir				<1	
	Aedes aegypti	Western equine encephalitis			Man, horse, house mouse, cotton rat, domestic bird, passerine bird			
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis						
		Eastern equine encephalitis						
		St. Louis encephalitis				7	8	n
	Culex tarsalis	Western equine encephalitis				0	<1	
		St. Louis encephalitis				7	9	n
	Mosquito?	Filariasis	Host	Microfilaria sp.	Passerine bird	0	0	
Melospiza georgiana	Ixodes brunneus	Wild bird paralysis	Tick host	None		0	0	
Swamp sparrow	Ixodes dentatus	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, rabbit, Norway rat, passerine	2	18	n
		Tularemia		Pasteurella tularensis	bird, cotton rat	1	12	
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird,	?	18	
		Q. fever		Coxiella burnetii	passerine bird	0	0	
		Tularemia		Pasteurella tularensis		1	12	n
		California encephalitis		Virus		0	0	
		Western equine encephalitis				0	<1	

(Continued)

Table 2 (Continued)

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likelihood of Occurrence
Melospiza georgiana	Ixodes scapularis	Tularemia	Tick host	Pasteurella tularensis	Man, dog, cattle, Norway rat, raccoon, opossum, rabbit, cotton rat, skink	1	12	a
Swamp sparrow (Continued)		Anaplasmosis		Anaplasma marginale		0	0	c
	Aedes aegypti	Western equine encephalitis	Reservoir	Virus	Man, horse, house mouse, cotton rat, domestic bird, passerine bird		<1	b
	Aedes sollicitans	Eastern equine encephalitis						
	Culex pipiens	Western equine encephalitis Eastern equine encephalitis St. Louis encephalitis				7	8	a
	Culex tarsalis	Western equine encephalitis St. Louis encephalitis				0 7	<1 8	b a
Melospiza melodia	Ixodes dentatus	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, rabbit, Norway rat, passerine bird, cotton rat	2	16	
Song sparrow		Tularemia		Pasteurella tularensis		1	12	
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Rabbit, cotton rat, cat, domestic bird, passerine bird	2	16	
		Q. fever		Coxiella burnetii		0	0	c
		Tularemia		Pasteurella tularensis		1	12	a
		California encephalitis Western equine encephalitis		Virus		0 0	0 <1	c b
Eumeces sp.	Ixodes scapularis	Tularemia		Pasteurella tularensis	Man, dog, cattle, Norway rat, raccoon, opossum, rabbit, cotton rat, skink	1	12	a
Skink		Anaplasmosis		Anaplasma marginale		0	0	c
Terrapene ornata	Ornithodoros turicata	Recurrent fever		Borella recurrens B. turricata	Man, horse, swine, cattle, rabbit			
Ornate box tortoise		Rocky Mtn. spotted fever		Rickettsia rickettsii		2	16	a
		Leptospirosis		Leptospira pomona		2	5	
		Tularemia		Pasteurella tularensis		1	12	
		Rabies		Virus		0	<1	c

(Continued)

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Table 2: Notes, Bolivar Peninsula

1. Nearby Brazoria County, Texas, has been the only recent site of tick surveillance.

2. Chagas' disease or American trypanosomiasis is a potential threat. All the vectors and reservoir hosts are present, but human cases are rare in the U. S.

3. Leprosy incidence has dropped from 34 in 1972 to 17 in 1975. Involvement of armadillo is not well defined at this time.

4. A high proportion of reported cases occurred in counties adjacent to the HDP field site.

5. Thirty-three St. Louis encephalitis cases were reported in Harris County in 1975. Only Jefferson County, Texas, participated in the 1976 surveillance program. Harrison and Jefferson Counties are near the Bolivar Peninsula.

6. This disease is usually not reported by health organizations.

7. Plague has not been reported in the 1971-1975 period, but was reported in the 1900-1970 period.

8. No reports by county are available.

9. A total of 330 veterinary ravies cases have been reported per year statewide.

10. A. fever has not been reported from this area, but vectors are present.

11. Local food poisoning reports and salmonellosis reports are not available. Packaging and transport of food moves contaminated material out of the immediate area of contamination.

Table 3

Potential Medical and Veterinary Diseases at Windmill Point

Host	Vector or Intermediate Host	Disease	Role of Host in Disease	Pathogen	Hosts of Economic Significance	Human Infections per Year	Average for State	Likel o Occur
Charadrius vociferus Killdeer	Culex pipiens	Western equine encephalitis	Reservoir	Virus	Man, horse, domestic bird, passerine bird, rodent	0	0	
		Eastern equine encephalitis					<1	
		St. Louis encephalitis					<1	
Agelaius phoeniceus Red-winged blackbird	Dermacentor variabilis	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, dog, rabbit, rodent, passerine bird	<1	77	
		Tularemia		Pasteurella tularensis		0	0	
		Anaplasmosis		Anaplasma marginale				
		Colorado tick fever		Coxiella burnetii				
		Tick paralysis		None		Not reported	Not reported	
	Haemaphysalis leporis-palustris	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, rabbit, rodent, passerine bird	<1	77	
		Tularemia		Pasteurella tularensis		0	0	
	Amblyomma maculatum	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, rabbit, dog, rodent, passerine bird	<1	77	
	Culex pipiens	Western equine encephalitis	Reservoir	Virus	Man, horse, domestic bird, passerine bird, rodent	0	0	
		Eastern equine encephalitis					<1	
		St. Louis encephalitis					<1	
		Avian malaria	Host	Plasmodium reticulatum P. cathemerium P. elongatum P. hexamerium	Passerine bird		0	
Porzana carolina Sora	Amblyomma americanum	Rocky Mtn. spotted fever	Tick host	Rickettsia rickettsii	Man, rabbit, rodent, passerine bird	<1	77	
		Tularemia		Pasteurella tularensis		0	0	
		Tick paralysis		None		Not reported	Not reported	
Ondatra zibethica Muskrat	Ixodes dentatus	Rocky Mtn. spotted fever		Rickettsia rickettsii	Man, rodent, passerine bird, rabbit	<1	77	
		Tularemia		Pasteurella tularensis		0	0	

Table 3: Notes, Windmill Point

1. Dermacentor variabilis has been implicated as vector of Rocky Mountain spotted fever in Virginia.

2. The year 1975 was the first time arthropod-borne encephalitis was reported in Virginia. In 1975 there were two cases of eastern equine encephalitis and one St. Louis strain. In 1976 there were three cases of St. Louis encephalitis in and around Richmond. This may represent an emerging zoonosis. The dense populations of passerine birds may require management.

3. Colorodo tick fever was previously isolated on the east coast at Long Island, New York.

4. Dermacentor variabilis was confirmed as the cause of tick paralysis in Virginia in 1948.

5. Rocky Mountain spotted fever transmission by Ixodes denatatus was confirmed in Prince George County, Virginia, in 1952.

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In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Simmers, John W
A survey of potential medical and veterinary diseases at habitat development field sites / by John W. Simmers. Vicksburg, Miss. : U. S. Waterways Experiment Station ; Springfield, Va. : available from National Technical Information Service, 1978.
44 p. ; 27 cm. (Miscellaneous paper - U. S. Army Engineer Waterways Experiment Station ; D-78-1)
Prepared for Office, Chief of Engineers, U. S. Army, Washington, D. C., under DMRP Work Unit No. 2A10.
Bibliography: p. 43-44.

1. Disease vectors. 2. Dredged material. 3. Habitat improvement. 4. Habitats. 5. Marshes. 6. Waste disposal sites. I. United States. Army. Corps of Engineers. II. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Miscellaneous paper ; D-78-1.
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